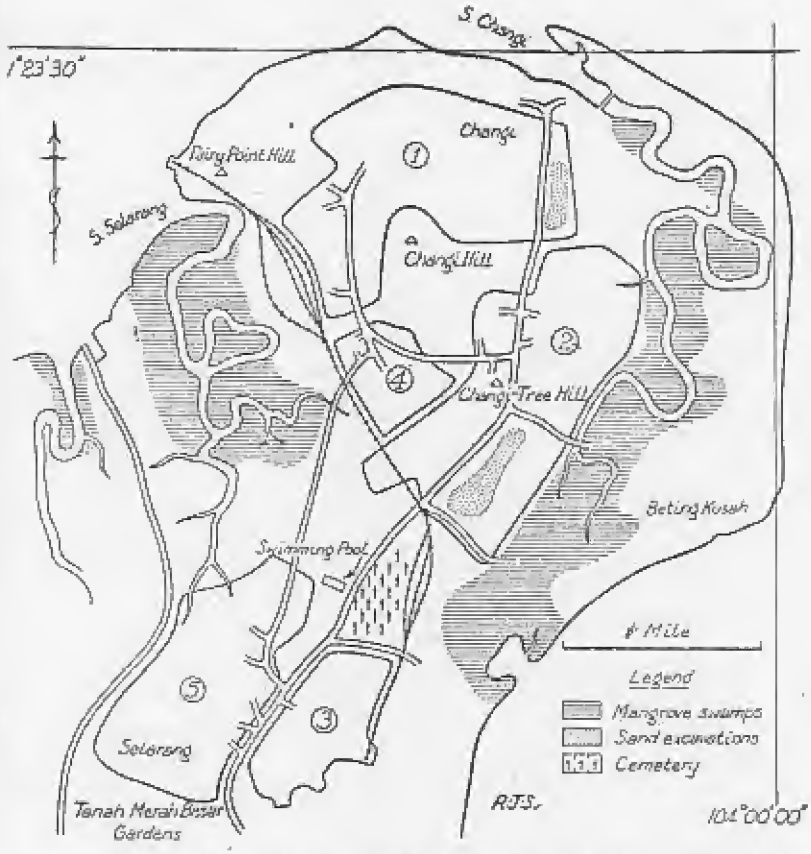
Nesting habits of some Singapore Birds

By R. J. SPITTLE

The observations which comprise this paper were made on the Changi Promontory, at the eastern end of Singapore Island, while the writer was held there as a military prisoner-of-war. With a few exceptions, the notes date from the eighteen months between 10 December, 1942, and the end of May 1944; and include those supplied by Mr. E. K. Allin, a fellow prisoner, who was formerly a resident of Perak. The position of the Camp in relation to the salient features of the district is shown on the accompanying sketch-map.

Geographically, the Promontory is composed of a block of low hills, with fairly steep slopes and rather narrow valleys, which reaches its highest point at Changi Hill, alt. 150 feet. Surrounding this is a belt of more gently undulating land cut by two extensive mangrove swamps and fringed by both mud and sand flats. These latter were, of course, outside the boundaries of the Camp although near enough for birds to stray in from them. On the higher ground the surface soil is laterite and supports a varied flora in the gardens (both vegetable and ornamental), abandoned arable land, grassy spaces, orchards, secondary wooded areas and small coconut and rubber plantations. In general the landscape is typical of the open and lightly treed outskirts of many Malayan coastal towns.

The notes are published in order to augment the limited amount of information in print on the nidification of birds in Malaya; but, at this stage, no attempt is made to correlate them with other findings. The principal sources at present available are the *Birds of the Malay Peninsula* (4 vols., Robinson 1927, Robinson 1928, Robinson & Chasen 1936, Chasen 1939), *An Introduction to Malayan Birds* (Madoc 1947), *Notes on the Nidification of some Perak Birds* (Edgar 1933) and papers in this journal (Gibson-Hill 1950). A catalogue summarising the published data and including a large amount of unpublished material is at present in production at the Raffles Museum, and will form a future Raffles Museum Bulletin (Gibson-Hill, in preparation). The entries here are given the numbers accorded to the birds in the *Annotated Checklist of the Birds of Malaya* (Bull. Raff. Mus., 20, 1949) to facilitate reference to this and subsequent catalogues.



Sketch-map of the Changi Promontory, showing the extent of the Camp from which most of the observations were made. The latter was gradually reduced in size, as the prisoners were moved away, until eventually only the section marked (5) remained open.

78. **Excalfactoria chinensis chinensis** (Linn.).

Bluebreasted Button-Quail.

The only indications of breeding were a few small and compact coveys, averaging seven birds in each, which were flushed between April and June and in August.

91*a*. **Turnix suscitator atrogularis** (Eyton).

Barred Bustard-Quail.

A family of five, with young about two-thirds grown, was flushed from weedy land on 24 April, 1943; and another party in late July of the same year. A chick, a day or two old, was

captured, and another was heard calling, among weeds in an old Derris plantation near its junction with an extensive tract of Lalang on 22 January, 1944. A nest containing eggs was found by Allin amongst Kĕladi on 8 August, 1943.

93. **Rallus striatus gularis** Horsf.

Slatybreasted Rail.

A juvenile was seen on 19 June, 1943, in the mangrove belt.

166. **Treron vernans griseicapilla** Schleg.

Pinknecked Green Pigeon.

A nest, with the bird sitting, was discovered by Allin in secondary jungle near Changi Gaol on 6 May, 1944.

175. **Streptopelia chinensis tigrina** (Temm.).

Spotted Dove.

This dove breeds commonly over an extended season with its peak from February to April. Nests with eggs or young were found in February, March, May and August; post-nest juveniles were seen in February, March and April. The clutch is normally two in number, but one nest found on 9 March, 1943, contained three chicks which were reared successfully (Allin).

The nest site varies considerably. Nests were found most frequently in and around gardens, shrubberies and orchards, and in roadside shade-trees. One was exposed in a fork of a bare horizontal branch near the top of a Flame Tree, about 20 feet above the ground. Another was well sheltered in a Bougainvillea bush at a height of less than 6 feet.

The nest consists of a loose and flimsy platform of intertwisted sticks. The materials used are generally of two qualities, those for the foundation being longer, thicker and more crudely woven than the ones that form the lining. One of the nests measured 17 by 12 inches across, and was slightly depressed to accommodate the sitting bird. The foundation was constructed mainly of dried grass stems such as those of Rumput Tembaga Jantan. Several of these, together with a dead tree-root, averaged 18 inches long and were laid straight—without any attempt to bend them into the shape of the nest. Another stem, 27 inches long, had been bruised in six places and curled round to form the main support for the super-structure, together with a loose coil of bell-wire of similar length. The lining was composed largely of the stems of the Bermuda grass, to which had been added a few other plant fragments, including a species of *Borreria*.

176. **Geopelia striata striata** (Linn.).

Barred Ground-Dove.

This species nests sparingly, chiefly during the early part of the year. Nests with eggs (two in a clutch) were found

in May and June, and one containing a single young chick in February; post-nest juveniles were seen in February and March.

The only nest examined was situated about 18 feet from the ground in a Chempedak tree, one of several growing near the edge of a Lalang field. It was a much smaller and frailer structure than that of the previous species and rested upon a dead leaf, the blade of which measured 5 inches long by 2¼ inches wide. Otherwise, the foundation consisted only of a dead tree-rootlet and half a dozen dried grass stems, some of which had the roots attached. These materials, measuring up to a foot in length, were arranged in the form of a star, their ends protruding in all directions. The lining was built on this base, in a depression measuring 3½ inches long by 2¾ inches wide and ½ inch deep. It consisted of a loosely woven collection of much finer material, with pieces up to 8 inches long; these included the dried stems of grasses, a species of *Oldenlandia* and wiry rootlets.

206. **Centropus bengalensis javanensis** (Dum.).

Lesser Crow-Pheasant.

At least seven pairs of this bird were located during 1944. The nesting season is extended, and it is possible that two broods are reared in a year. Empty nests were found in March and May, nests with eggs in March and April, and post-nest juveniles in February, June and early October. The normal clutch is two.

The nests are always well concealed in dense vegetation, and usually they are close to the ground. Two of the five nests found were built in pure stands of Lalang, one was in a tall clump of Sensitive Plant which was growing amongst Lalang, and the other two were in a mixed jungle of Hujan Panas, Mempelas, Straits Rhododendron, Timun Dendang and various grasses. The average heights of these were 2½ feet, 3 feet and 6¾ feet respectively, and the nests themselves were situated from 1–3 feet above the ground and from a half to 1½ feet below the top of the vegetation.

The nests are bulky, dome-shaped structures. Those examined were about 7 inches long by 6 inches wide and 10 inches high. They were constructed almost entirely of dead Lalang leaves, ranging from 9 to 20 inches in length. In addition a number of living ones were also incorporated, by bending them over and weaving them into the outer fabric. Only in one of the nests were additional materials used: three Rubber tree leaves in the lining and two tail feathers of the Crow-Pheasant in the outer covering.

The entrance hole, which occupied a more or less central position at the front of the nest, was roughly triangular in shape and measured 2½ inches wide across its base and about the

same in height. This opening was more or less concealed from view by live grass-stems which had been drawn vertically across it in the form of a curtain and then incorporated into the general structure of the dome.

240. **Apus affinis subfurcatus** (Blyth).

House-Swift.

This bird breeds very commonly over an extended season. Occupied nests were found at all times between 16 December and 15 August. The clutch is only two in number.

The majority of the nests were confined to two colonies located in water-towers. At one of these as many as fifty were counted on 4 May, 1943 (Allin). The towers were entirely constructed of reinforced concrete and in each case the tank was held in position by braced columns at some 60 feet above the ground. The nests covered the greater part of the under surface of these tanks, and were attached to each other in such a way that they afforded reciprocal support.

Elsewhere, the birds built more or less singly in barrack-blocks and houses. Verandahs were chosen quite commonly, but even inhabited rooms were sometimes used. Here the nests were situated close to the ceiling and either in a corner or on some projecting nail or ledge. Only once was a nest found to be attached to the face of a wall, but in this case the necessary key for the adhesion of the nest-material was provided by the rough surface and the presence of a small crack.

Another nest was built in a 6 inch gap between the ceiling and a beam in a bomb-damaged building. It was a shallow receptacle, which measured about 8 inches across the front but was shaped in such a way as to extend to the ceiling on one side and provide a 3 inch entrance at the other. The materials used in its construction consisted chiefly of the dried modified branches of the Queensland Swamp Oak and the brown breast feathers of chicken, held together by hardened saliva produced by the bird itself. The outer surface was roughly finished, with many bits left hanging; the interior was quite smooth and unlined.

The nests varied considerably in both shape and size, from frail crescent-shaped structures to large globular ones, and with the entrance hole either at the top or in the side. These differences were undoubtedly influenced by the nest-site; in addition some were occupied for several seasons in succession and augmented from year to year. In a few cases the birds had appropriated unoccupied nests of the Resident Swallow.

259. **Halcyon smyrnensis fusca** (Bodd.).

Whitebreasted Kingfisher.

One brood of noisy youngsters was located at Changi Hill on 10 May, 1943, and another near the military swimming pool

during the same year. In both cases the nests were constructed at the ends of tunnels excavated horizontally into steep sandy banks (Allin).

261. **Halcyon chloris humii** Sharpe.

Whitecollared Kingfisher.

Three nests were located. Two were situated in holes in the trunks of Coconut palms, and the third was in an old and gnarled Durian tree growing about a mile from the coast. In one instance the same site was utilised three times in succession. It was occupied by three nestlings on 9 May, and by three eggs on 13 July, 1943 (Allin), and by two young and one addled egg on 9 April, 1944.

This latter nest was situated in a cavity adapted from a hole made by a shell-splinter and approximately half-way up the trunk of a Coconut palm. It was about 15 feet above the ground, where the trunk measured 9 inches in diameter. The entrance was irregular in shape and measured roughly 3¼ inches high by 1¾ inches wide. The nest cavity, however, was quite smoothly finished having been chipped out where necessary by the birds themselves. It measured approximately 5¾ inches high by 4¾ inches in diameter. The walls of the chamber were thus just over 2 inches thick. The floor was sunk 1¼ inches below the thresh-hold of the entrance, and the ceiling raised one inch above the top of the opening. Nest-materials were scanty and consisted chiefly of wood-chippings and fragments of insects and egg-shells.

The young recorded for the 9 April were only a day or so old, blind, naked and practically white-skinned. Their egg-shells were found at the base of the tree, no attempt, apparently having been made to remove them further afield.

265. **Merops viridis viridis** Linn.

Bluethroated Bee-eater.

A colony of about half a dozen pairs was located breeding in an overgrown sand-pit near Changi village. All the nest holes were situated near the top of an almost vertical face, some 15 feet in height, which rose directly from a sheet of shallow seepage water. Only two pairs of birds were observed on 20 March, 1943, but these had increased to at least five pairs three days later. By 29 March, they had begun to excavate their tunnels, some of which had attained a length of 5 feet (Allin).

304. **Dinopium javanense javanense** (Ljungh).

Goldenbacked Threetoed Woodpecker.

Evidence of possible breeding was noted on 21 July, 1943, when a female was seen to enter, and after a few minutes leave.

a hole in the trunk of an apparently healthy Coconut palm which was growing at the edge of a small plantation. The entrance, which was situated about half-way up the trunk and 15 feet from the ground, had been roughly hewn to a diameter of about 2 inches, and presented a very ragged appearance as a result of strips of bark having been pulled from the edges.

333. **Hirundo tahitica abbotti** (Oberh.).

Resident Swallow.

This was a common nesting species within the Camp. The breeding season extended from the beginning of February to the middle of June and during this time at least two broods were reared, usually in the same nest. In one instance, a pair had completed their nest by 9 February—it contained eggs six days later—and reared young which flew on the 23 March; then, after less than a month, by 22 April, they were sitting again, the second brood leaving the nest on 7 May. The usual clutch is three.

All the nests were associated with various kinds of reinforced concrete buildings, except for one found by Allin under a jetty at Fairy Point. A typical nest which was examined had been built in the corner of a lobby, just below the ceiling and about 15 feet above the floor. For support it used the converging, rough-surfaced concrete walls and some electric conduits fixed to the walls on thin wooden laths. The nest, shaped like an inverted quarter-cone, measured externally 6½ inches across the top and 3 inches in depth, and there was a space of 1 inch between its rim and the ceiling. The outer parts were constructed of red laterite and a dark brown clay; but intermixed, to give strength to this mud, were a few dried grass stems and leaves, other vegetable fibres and chicken breast-feathers. Inside it was thickly padded; first with coconut fibres, and lastly with chicken breast-feathers, the quills of which had been removed.

The owners of this nest were first noticed in the locality on 27 January when they were already paired. The nest, which contained newly-hatched young, was found on 19 February, twenty-three days later. By 8 March these nestlings were fully feathered and spent the greater part of their time perched on the edge of the nest and taking occasional short flights into an adjoining room. The following day they vacated their nursery, but returned to it for sleeping during the next four nights.

341. **Lalage nigra nigra** (Forst.).

Pied Cuckoo-Shrike.

At least six breeding pairs of this bird were located during 1944. The season extended from the beginning of February to

the middle of June and during this time two broods were reared. The full clutch is two.

The birds are very conservative in their choice of nesting sites, and in two instances the same nest was used on more than one occasion. One of these was found to contain two fully fledged young on 22 May, 1943. It was not visited again until 3 March the following year: then an adult was seen standing over the old structure, and by 11 March it contained two eggs. The other nest contained well-developed young on 15 April, 1944, and eggs on 13 May of the same year.

All the nests found were in trees, particularly the Chĕmpĕdak, Halban and Rubber, and generally quite close to a road or footpath. They were situated between 15 and 20 feet from the ground, usually on a horizontal branch and well away from the trunk. In every case they were shaped in such a way as to give the impression of continuity, thus rendering them difficult to discern from the ground.

One nest was examined in detail. It was a shallow receptacle with concave sides, measuring externally 2¾ inches in diameter and up to 1½ inches high, with a depression of half an inch. The materials used were almost entirely composed of coconut fibres, ranging from 3 to 15 inches long. In addition a few leafless secondary rachides of the Flame-Tree, a modified branch of the Queensland Swamp Oak and one or two smaller pieces of plant-tissue were also included. These fibres, selected so that the longest and thickest formed the outer parts and the shortest and finest the lining, were arranged in a series of coils. These were held together by means of a white silken material which had been plastered in more or less vertical strips over the outer walls. These threads also served to fasten the nest to its support, and, by giving a mottled greyish effect, acted as a camouflage in combination with the lichen covered bark of the branch.

3516. **Oriolus chinensis maculatus**, Vieill.

Blacknaped Oriole.

Six instances of breeding were recorded from the Camp during 1943 and 1944. The available data suggest that nesting continues throughout the first half of the year: one nest was found on 9 March and another was kept under observation during March and April (Allin); post-nest juveniles accompanied by parents were seen on 20 January, 8 March and 27 June.

Both the nests mentioned were situated in Pulai trees. They were 20–30 feet from the ground and each was slung within the angle formed by the forking of a horizontal branch about

6–10 feet from the main trunk. The nests, fair-sized and oval-shaped cradles, were neatly but firmly bound to their supports. They were constructed of dried vegetation which had been interlaced in such a way as to form a smooth, thin and even fabric throughout.

414*b*. **Aegithina tiphia singapurensis** Chas. & Kloss.

Common Iora.

A nest, built in a tall unidentified tree, was found by Allin in April 1943, and juveniles were seen in the immediate vicinity towards the end of the following month.

431. **Pycnonotus goiavier personatus** (Hume).

Yellowvented Bulbul.

Occupied nests were found from the beginning of February to the end of April, but although this period marked the peak of the season, it is likely that sporadic breeding continued to a much later date. Only in one instance were two broods recorded in a year; in this case a pair built a second nest on top of their first. The usual clutch is two.

The nest is almost invariably situated in the fork of a bush or tree between 3 and 15 feet above the ground. In the Camp area an unidentified species of solid-stemmed Bamboo was particularly favoured in this respect, but almost any bush that provided the necessary support and concealment might be used.

Six nests were examined and all of these showed a marked similarity in shape and size. Externally each resembled an inverted cone 4–5 inches in diameter and 3–4½ inches deep; the cup was about 2¼ inches across the rim and 2 inches in depth.

The materials used were alike in character. These were arranged in well defined layers throughout the entire structure. Flat pieces used as padding were alternated with thin strands which served to bind the mass together. The former was largely composed of dead, and in many cases skeletonised, leaves from a variety of trees, including the Chĕmpĕdak and Rubber. To a much lesser extent pieces of skeletonised coconut leaf-bracts, and once a piece of newspaper, were also used. These materials were held together by strips of Lalang leaves, woody rootlets of bamboos etc., coconut fibres, thin strips of coconut bark, dead Kangkong Paya stems, and also whisps of brown and white silk obtained from the cocoons or webs of some insect or spider. In one nest the midrib of a coconut leaflet measuring 15 inches long was found attached to the outer covering. In all cases the lining was composed entirely of coconut fibres neatly woven around the inner walls.

450. **Copsychus saularis musicus** (Raffl.).

Magpie Robin.

This bird bred freely within the Camp, but only three nests were actually discovered. One of these contained eggs on 4 April; and another, nestlings on 7 May. Post-nest juveniles accompanied by their parents were seen in February, June, July and August. The usual clutch is four in number. Possibly two broods are reared in a year.

The nest-sites included the flue-pipe of an old stove and a disused electric switch-box attached to a barrack room wall (Allin). The third nest was situated in a cavity made by shrapnel at the top of a Coconut palm, immediately below the terminal shoot and about 9 feet above the ground. The hole, irregular in shape, measured roughly 6½ inches in both diameter and height. It was protected from above by the main shoot, and also by the bases of the few remaining fronds. The walls were perforated on all sides; the largest hole, which was the one used by the birds, was 6 inches high and 2 inches wide. The nest was entirely composed of the dead and leafless secondary rachides of the Flame Tree, the nearest example of which grew some 37 yards away.

466. **Cisticola juncidis malaya** Lynes.

Streaked Fantail Warbler.

This warbler, which is common in open grassland on Singapore Island, breeds over an extended season. Nests were found in the process of construction in May; with eggs in March, April, May and July; and with young in March and October. In addition a pair was observed courting towards the end of December. The full complement of eggs is 2 or 3.

The sites selected for the nests varied little, being always amongst grass. Lalang was by far the most favoured plant in this respect, although occasionally Rumput Sarang Buaya and a species of *Sporobolus* were also used. The nests were built from 8 to 26 inches above the ground and from 8 to 18 inches below the average height of the vegetation. In each case they were supported by a group of stems and leaves, 30–60 in number, which were incorporated into their sides. By drawing the herbage together in this way the weight of the nest is distributed evenly over its various supports; indeed the load is so light that it is often carried upwards with the growth of the stems.

The nest was a delicate, thin-walled and pitcher-shaped structure. Measured externally it was about 3½ inches tall and 2¼ inches wide at its broadest part, but only just over 1½ inches across its rim. The deep cup constricted at the top is undoubtedly a precaution against excessive swaying which must inevitably occur in such a situation. As a protection

against sun and rain one side of the nest was often raised to as much as 1½ inches above the other and bent over the orifice in the form of a shield.

The principal material used was Lalang pappus, together with an occasional silken insect cocoon and threads from spiders' webs. But dissection invariably revealed that the thickened lower parts of the nest were well padded with small rootlets and vegetable fibres generally, in addition to dried and frayed fragments of Lalang and other grass-blades. The upper portions of the nest fabric were flimsy and relied for support on the grasses attached to the walls. The floor on the other hand was sufficiently solid and rigid to give a definite shape to the entire structure.

468. **Prinia flaviventris rafflesi** Tweed.

Yellowbellied Wren-Warbler.

At least six pairs were located during 1943 and 1944, but only three nests were actually found. One nest was discovered in the course of construction on 30 May, 1943, had its first egg on 5 June, and the young (three in number) were hatched on 21 or 22 June (Allin). The other two nests were found in April and May, suggesting a short, well-defined breeding season.

The nests were not particularly well concealed. They were situated on the edges of dense clumps of vegetation; usually by the side of a track. Only one was examined in detail and this was placed amongst Lalang and bushes of Bĕluntas on a hill slope which also supported patches of Bamboo, Straits Rhododendron and occasional Coconut palms. Unfortunately this nest was in a somewhat dilapidated and weather-beaten condition. It was wedged between stems and sprigs of leaves and situated 23 inches above the ground and 16 inches below the average height of the vegetation. It was a globular-shaped structure, rather bulky and loosely woven, with the entrance at the side. It measured 6 inches high by 3 inches wide externally, and the entrance hole was about 1½ inches in diameter.

The materials used in the outer covering were composed almost entirely of the dried seeding heads of Lalang, from which most of the pappus had been removed. With these were a few frayed portions of dried Lalang leaves and stems. The shorter pieces formed the bulk of the structure, particularly the base, and the longer ones the top and sides. The lining was composed of much finer stuff; coconut fibres, the delicate stems of an *Oldenlandia* and the seedless heads of a grass, *Eragrostis* sp.

481*a*. **Orthotomus atrogularis atrogularis** Temm.

Blacknecked Tailor-Bird.

Compared with the Longtailed Tailor-Bird, the present species seemed to be rather less numerous. The breeding season

and nesting habits were, however, much the same as those described for the former bird.

482. **Orthotomus sutorius maculicollis** Moore.

Longtailed Tailor-Bird.

The species breeds commonly over an extended season. Nests in the course of construction were found from January to March, and in May and August; with eggs in April and August; and with young in March, April and July. Post-nest juveniles accompanied by their parents were seen in March, June and August. The clutch ranges from two to four in number.

The nests found were situated in a variety of plants: saplings of Ara Perak were the most favoured in this respect, but such kinds as the Brinjal, Guava, Mahang Puteh and Shoe-flower bush were also used. They were placed at no great height, and the majority ranged from 2–6 feet above the ground.

This species, in common with other tailor-birds, contructs its nest in a pocket made by sewing together one or more living leaves. It is not surprising, however, that when dealing with such variables as the number, shape and size of these leaves, their orientations, and the kind of sewing materials available, the finished structures differ considerably in appearance.

Single leaves are employed where these are sufficiently large, as for instance those of the Ara Perak whose blades measure as much as 8 inches long by 7 inches broad. In the case of the Guava, where each leaf averages only 5 inches long by 1¾ inches broad, as many as 4 may be used. In every instance, the leaf-blade or blades were bent in such a way that their lateral margins could be sewn together. Where the leaf was large, undivided and displayed in a horizontal plane, its sides were always bent downwards and joined from below, the mid-rib then being analogous to the ridge of a roof as it ran along the top (or, with a drooping leaf, down the back) of the nest. The stitching or lacing, was chiefly confined to the margins of the leaves and only a small portion near the stem was left free to form a porched entrance.

In the nests examined the materials used for lacing included brightly coloured darning wool, cotton-wool, Lalang pappus, silken strands from insect or spider cocoons and vegetable fibres. Usually a series of single transverse links were made and secured by means of a knot formed on the outer sides of each pair of opposite holes. Occasionally a more complicated method was employed; that of fastening one end of the thread as before and then passing the other end through several holes on alternate sides before finally securing it. It is of interest to note that the holes were almost invariably made behind the marginal veins of the blade, thus reducing the chances of its tearing.

The nests proper, snugly ensconced within their leaves, varied greatly in size. The diameter of the rim remained more or less constant at just over 2 inches, but the cup ranged from a mere half inch to almost 3 inches deep. In almost every instance they were composed of Lalang pappus intermixed with fine coconut fibres, grass leaves and rootlets. In only one nest was there a distinct lining, of shredded vegetable matter, present.

483. **Orthotomus sericeus hesperius** Oberh.

Redheaded Tailor-Bird.

A family party was seen by Allin in open scrub on 3rd June, 1943.

522. **Anthus novaeseelandiae malayensis** Eyton.

Malay Pipit.

The breeding season apparently covers the period from February to July. During this time nests were found in the course of construction in February and March; with eggs from March to June; and with nestlings in March. A fledgeling was seen in July. A pair were observed courting as early as 24th December. Normally two broods are reared in a year, and the clutch is three.

The birds show a strong inclination to keep, more or less, to the same nest-site and two pairs kept under observation during 1944 illustrate this point. One nest, found partly built on 15th February was deserted by the 19th; but a second one had been completed by 4th March, only one and a half yards away. The other pair was found incubating a full batch of eggs on 16th March, the young flew on 8th April, and the second nest with a complete clutch was discovered eighteen yards away on 13th May.

The nests are built on the ground, well concealed against a clod of earth or a clump of grass. A favourite position is an exposed grassy bank. The following are typical examples of the vegetation, which is normally 6–12 inches in height; in the case of one nest, solely Rumput Tembaga Jantan; in a second, young Lalang and Bermuda grasses; in a third, an assortment of such plants as Bermuda grass, Rumput Tembaga Jantan, Sensitive Plant and species of *Eragrostis, Oldenlandia* and *Senecio*.

The nest is generally built over a small depression in the ground, which may have been scratched by the bird itself. This scrape measures up to 4½ inches in diameter and about 1 inch in depth. It is so shaped that when lined it conforms to the general contour of the brooding bird. Over this cup is constructed a canopy of variable extent, depending on the amount of cover provided by the surrounding vegetation. In the case of three nests examined the exterior dimensions ranged from

5–6½ inches wide, from 4–6 inches from front to back, and from 3½–7 inches in height above the ground. The entrance measured from 1¼–2½ inches across, and was generally approached by a pad of material up to 3 inches thick.

The materials are mainly dried vegetable matter. The outer parts are generally made up of the stems and leaves of grasses, fragments of Lalang leaves, small pieces of the leaflets, leaf-sheaths and fibres of the coconut, a few bits of skeletonised leaf-blades, one or two grass-roots, etc. The interior is lined with much finer stuff; for example, coconut fibres, frayed grass-blades, a few seeding stems of a species of *Eragrostis*, the detached veins from Lalang leaves and grass rootlets; while in one nest there were a number of hairs which, bent double, had obviously been derived from a broom.

532. **Acridotheres tristis tristis (Linn).**

Common Myna.

Many instances of breeding were recorded extending over a period of more than two-thirds of the year. The flocks start to break up during the latter part of November, and by the end of December many of the birds have paired off. One couple was noticed examining a nest-site as early as 4th January and birds were seen carrying nest materials at different times from 15th January to 1st September. Nests were found with eggs in February and July (Allin); and with young in February, May and August; post-nest juveniles accompanied by their parents were noted from March to May, and in July and August. The clutch is usually four or five in number, and the number of broods reared during the course of a season is generally two. Sometimes the latter may be increased to three, since nestlings were heard chattering in one nest during the middle of March, at the end of May and at the beginning of August, i.e., at intervals of just over two months. The short interval which may elapse between broods was further illustrated on another occasion when an adult was seen carrying a whisp of fluffy nest-lining and closely followed by two juveniles just capable of flight but still clamouring for food.

This Myna generally builds in a hole or crevice in a building or a tree. Apparently its requirements are simply an adequate size and shelter at a good height above the ground; something between 20 and 60 feet. Normally the nest is situated at the far end of the hole or in as dark a place as possible. In buildings, the roof is particularly favoured, and typical sites are at the ridge and the eaves, the nest being placed on the ridge-tree and the soffit board respectively. Cavity-walls are also used where they are accessible. Another site was in a pipe near the top of a water tower (Allin). The most common position

in trees is amongst the dead bracts etc., which accumulate about the bases of the leaves of the Coconut palm, and in holes that have resulted from decay, lightening, shrapnel and other agencies.

None of the nests were examined in detail, but judging from the materials that were seen being taken up to the sites—dried grass leaves and stems, feathers, rag and other gleanings from the Camp—it would seem that almost anything that is dry and soft may be used to make up its bulk. On one occasion, a piece of white bandage, about 6 inches long, was carried off by a bird which held it at one end and allowed the other to trail behind like a streamer.

535. **Anthreptes malaĉensis malacensis** (Scop.).

Brownthroated Sunbird.

This species bred sparingly within the Camp. Although it seemed to pair off very early, towards the end of November, nests containing either eggs or young were not found until 4th May, 1943 and 16th February and 26th April, 1944 (Allin). The only other breeding records are a family party seen on 3rd June, 1943, and a fledgeling being fed by its parent on 11th May, 1944. However, during this period, from February to June, at least two broods may be reared. The clutch number is always two.

The three occupied nests mentioned above, together with another three old ones, were all found between 10 and 15 feet above the ground in the same tree. This, a thickly foliated Chēmpēdak, was growing in an ornamental garden within a few yards of a house, and was heavily infested by the pugnacious Red Ant, *Œcophylla smaragdina* Fabr., several colonies of which were located within a yard of the nests. This accords well with the statement by Edgar (1933: 159), writing of Lower Perak, that "out of some twenty-five nests examined ..... only one (was) not placed in a site already infested by Red Ants."

All the nests were suspended from horizontal leafy twigs about a foot from their tips and at a point where the oldest and dying leaves occurred. Each was a delicately constructed bulbular structure surmounted by a somewhat conical shaped attachment-piece and provided with a circular side entrance protected by a large arched porch. Overall, it measured just over 4 inches in height and 2½ inches across its broadest part. The entrance, about 1¼ inches in diameter, was so placed as to give a drop of an inch between the threshold and the bottom of the nest cavity.

The walls were composed of a thin parchment-like mixture of coconut fibres, Lalang pappus, insect cocoons and strands of spiders' web, lined internally with Lalang pappus, and sparingly

decorated on the outside with small slivers of coconut bark and, in one instance, part of the wing-case of a cockroach. Generally speaking, however, the nest was neatly and smoothly finished; and there was no suggestion of the "tail" of loose material that is so characteristic a feature of the nest of the Yellowbreasted Sunbird.

It is of interest to note, moreover, that in every case the strands which supported the nest extended along the branch for a distance of about 2 inches, and at the same time entwined the stalks of the leaves in such a way that when these died they were prevented from falling but instead draped themselves around the nest. From 2 to 5 leaves were thus incorporated, and since each measured about 5½–6 inches long by 2¾ inches wide they formed both a natural camouflage and additional protection from the weather.

539. **Leptocoma brasiliana brasiliana** (Gml.).

Purplethroated Sunbird.

A family party of four, both parents accompanied by two young, was observed by Allin on 3 June, 1943.

541a. **Leptocoma jugularis microlenca** (Oberh.).

Yellowbreasted Sunbird.

This bird breeds freely and for a period that extends over at least the first half of the year. Nests were found in the process of construction from January to June; with eggs in March, May and June, and with young in March. Post-nest juveniles escorted by a parent were seen in May, July and August; while unaccompanied couples in immature plumage were observed from April to October. The number of eggs laid in a clutch is two.

The nests are suspended from almost any convenient horizontal support, particularly an exposed plant-stem or wire fence. Thus of the dozen found, four were slung from barbed wire, three from Straits Rhododendron bushes, two from Rubber trees and one each from a Rubber sapling, a Bamboo bush and a Tembusu tree. Their position ranged from 1½ to 25 feet above the ground: but only one was built at the latter height, the remainder being placed below the 8 feet level. In practically every case, little or no attempt had been made to conceal the nests from view and some could be seen from many yards away. To some extent this conspicuousness is counter-balanced by their dark and ragged appearance, like so much rubbish.

The nest somewhat resembles an elongated pear in shape. Measured externally it is from 4 to 7 inches in height, and just over 2 inches in width at its broadest part. The entrance-hole is situated at one side, and ranges from ¾ to

1½ inches in diameter. Immediately above this a wedge-shaped porch projects almost at a right-angle for about 1½ inches. Finally, from the bottom of the nest dangles a "tail" of loose material which varies considerably in length, from a mere suggestion up to as much as a foot. The walls are thickly constructed, and the nest cavity is deep and cosy, with a drop of 1¾ inches from the entrance.

The materials used to cover the nests examined included pieces of dried Lalang and other grass leaves, frass from an unidentified lepidopterous woodborer, pieces of dark from the Dĕrumun Padi, Guava and Rubber trees, dead leaves of Straits Rhododendron and Kangkong Paya, skeletonised bracts of a species of *Barleria*, seeding heads of a species of *Eragrostis*, pieces of string and cotton, blobs of cotton wool, Lalang pappus and the silken cocoons of insects. All of these were held in position by a network of fine coconut fibres and the adhesive threads of spiders' webs. The interior, however, was made up of much softer stuff, the two commonest items being Lalang pappus and the white breast-feathers of chicken, but in some cases intermediary layers of the red petals of the Shoe-flower were present.

552. **Dicaeum cruentatum ignitum** (Begb.).

Scarletbacked Flower-pecker.

The only definite evidence of breeding was a female seen feeding a fledgeling perched on a small Halban tree on 19 February, 1944. The food was administered as the parent hovered just in front of her offspring. During the intervals between feeds the youngster remained quite still, but uttered a continuous high-pitched call.

554. **Dicaeum trigonostigmum trigonostigmum** (Scop.).

Orangebellied Flower-pecker.

One young bird was seen by Allin near Changi Gaol on 20 January, 1945.

563. **Passer montanus malaccensis** Dub.

Tree-Sparrow.

This sparrow nests commonly and more or less continuously all through the year. Mating was observed in January, March, May, August and December; nests were found in the process of construction from January to May, August and September; occupied nests from January to May, and in July and December. Two or more broods are reared in a season, and the clutch number is usually four. The same nest may be used for at least two sittings; one, for instance, contained newly hatched young on 9 April and a freshly laid egg on 5 May.

The nests are associated with almost every kind of building. Typical sites are the spaces between sanitary fittings and walls

and ceilings or between louver ventilators, under the eaves of roofs, or in holes in masonry. The birds even compete for nesting-places with the Common Myna and, when the opportunity offers, will appropriate the nests of the House-Swift. Very occasionally they build amongst the branches of a tree.

The only nest examined in detail was situated near the top of a Halban tree, about thirteen feet from the ground. It was a bulky and untidily built structure, cone-like in shape to fit between the diverging branches. It measured ten inches in length and tapered from seven inches across one end to almost a point at the other. The entrance, which was placed in the larger end, was circular and just under 1½ inches in diameter.

The materials used in its construction were extremely varied, but were laid in three or more distinct layers. The outer covering was chiefly composed of dried Lalang leaves ranging from 8½ to 15½ inches long, Bermuda grass stems, several tree rootlets, two dried leaves of the Halban and a seeding head of a species of *Sporobolus*. The middle layer was chiefly confined to the basal portion of the nest, where it acted as additional padding, and was composed entirely of the seeding heads of Lalang nipped off at the base of the pappus so that little or no stalk was attached. Finally, the lining was a thick wad of much finer materials, comprising Lalang-heads with both pappus and stalk removed, grass rootlets, the breast-feathers of chicken, thin shreds of dried grass leaves, the seedless heads of Buffalo grass and a species of *Eragrostis*, short pieces of string, wool yarn and cotton, pieces of white cardboard, and two or three small grass plants complete with roots.

The birds are careless builders, and drop much of their nest material on to the ground. An examination of this further demonstrated the variety of litter that may be used. It included coconut fibres, leafless midribs of a *Cassia*, seeding heads of Rumput Sambau, flowering catkins of an *Acalypha*, the papery outer-bracts of an onion bulb, pappus from a Compositae, fluff from a blanket and strips of packing paper. Generally, the bulk of the material was obtained from within a radius of fifty yards of the nest site.

566. **Munia atricapilla sinensis** Blyth.

Blackheaded Munia.

Only two instances of nesting were recorded. On 4 April, 1943, a bird was seen carrying dry grass stems and leaves, one at a time, and depositing them amongst tall Lalang, which was growing through a barbed-wire barricade, bordering a Rubber plantation. On 6 May, 1944, a nest with four eggs was found by Allin in secondary jungle that had grown in the place of a felled plantation near Changi Gaol.

567. Munia maja maja (Linn.).

Whiteheaded Munia.

This Munia is a common nesting bird from February to August. It was observed building in March and July, and nests were found with eggs from February to April and in July, and with nestlings in August; post-nest juveniles were seen accompanying their parents from July to September. At least two broods were reared in a season, and there was one record of the birds using the same nest for both. This nest was found on 4 July, 1943, when it contained a number of droppings and pieces of feather-scurf: obvious evidence of a previous brood. But a week later, the first egg of the next clutch had been laid. The usual number of eggs in a clutch is 4–5.

The nests were placed in bushes and trees, and ranged from 2–20 feet above the ground. All were built in close proximity to human dwellings and often were only a few yards distant. The plants used were various species of Bamboo, and Coconut palm, Paku Laut, Sĕnjuang and Tampinis. In contrast to the Spotted Munia the present species tends to select the lower, darker and more sheltered positions; the nests usually being well concealed, either amongst thick foliage or, in the case of the Coconut palm, in the rubbish—old bracts, spathes, inflorescences and leaf-bases—that accumulate about its crown.

In shape it is globular with somewhat flattened sides; but the entrance hole is made to project forward in the form of a short "neck" to act as a combined porch and landing stage, thus giving the completed structure the appearance of a short-stemmed retort. The principal external dimensions varied from 4¾–6¼ inches long, 3½–6¾ inches wide and 5½–7½ inches tall. The upper portion of the neck measured up to four inches and the lower part, always the shorter, up to 2½ inches long. The entrance itself was circular in shape and 1½ inches in diameter. The drop from the threshold to the bottom of the egg-chamber was approximately one inch.

The nest is bulky, loosely woven, and rather untidily built, but it is quite strong and durable. Most of the material is used to form the base and the top, which are often more than an inch in thickness. The sides, on the other hand, consist merely of interlaced strands drawn slantwise between the top and bottom in the form of a more or less open lattice work. Of those examined, the outer parts were composed of the seeding-stems and leaves of Lalang each from 4–18 inches long; and the linings of finer stuff, as for instance the seeding heads of Buffalo grass and a species of *Eragrostis* from 4–9 inches long. In the seeding heads the fruits were allowed to remain on the stems when these formed part of the outer structure, but were removed when they were to be used inside.

Sometimes materials other than grasses were incorporated, but this only occurred in the covering. Generally these were leaves from the bush or tree in which the nest was situated, and occasionally unplucked or freshly picked vegetation was built into the structure. In one nest the leaves of Lalang, which were growing through the bush in which the nest was placed, were woven into the outer wall; in addition a Tampinis leaf-blade had been torn on either side of its midrib and threaded to the nest by means of a strand of grass. However, in another nest the sloughed skin of a snake was found!

568. **Munia punctulata fretensis** Kloss.

Spotted Munia.

This bird breeds commonly and over an extended season, from January to October. During this period two, or perhaps more, broods are reared. Nest building was noted from January to May and from July to September, and occupied nests were found from March to May and in July; post-nest juveniles accompanied by their parents were seen from July to October. The normal clutch is four.

The nests are mostly placed in rather exposed positions, in bushes or trees, at a height of 5–30 feet above the ground. Chĕmpĕdak, Coconut, Halban, Mango, Mĕmpoyan, Mĕndarong, Pinang, Pulai, Rambutan and Rubber were all used. The actual site of the nest varies greatly. In the case of the Pinang palm, for instance, it is placed either amongst the cluster of small branches that form the inflorescence at the side of the trunk, or at the point from which the leaves arise. In the Coconut palm it is often constructed amongst the rubbish about the base of the leaves. In the other trees it is usually the upper foliated branches which are used. Preference is generally given to positions in the neighbourhood of human dwellings.

The nests conform closely to those of the Whiteheaded Munia in shape, size, materials and method of construction. In fact it is doubtful if the two can be distinguished apart with any degree of certainty. One nest of the present species measured, externally, 7 inches long, 4½ inches wide and 6 inches tall. The entrance hole was practically circular and 1½ inches in diameter, and there was a drop of 1 inch from its threshold to the floor of the egg-chamber.

570*b*. **Munia leucogastra leucogastroides** Horsf. and Moore.

Javanese Whitebellied Munia.

Several nests were found by Allin. A family of four fledgelings were seen being fed by an adult as they perched in a row along the stem of a Papaya leaf on 27th June, 1948.

Appendix

Scientific names of the grasses, flowering plants, bushes and trees mentioned in the text.

Ara Perak (shrub) = ***Ficus alba*** Reinw.
Bamboo = species not identified.
Bĕluntas (shrub) = *Pluchea indica* Less.
Bermuda grass = *Cynodon dactylon* Pers.
Bougainvillea (shrub) = species not identified.
Brinjal plant = *Solanum melongena* Linn.
Buffalo grass = *Paspalum conjugatum* Berg.
Chĕmpĕdak (tree) = *Artocarpus champeden* Spreng.
Coconut (palm) = *Cocos nucifera* Linn.
Derris (shrub) = *Derris elliptica* Benth.
Dĕrumun Padi (tree) = *Elaeocarpus pedunculatus* Wall.
Durian (tree) = *Durio zibethinus* Linn.
Flame Tree ("Flame of the Forest") = *Delonix regia* Rafin.
Guava (tree) = *Psidium guajava* Linn.
Halban (tree) = *Vitex pubescens* Vahl.
Hujan Panas (shrub) = *Breynia rhamnoides* Muell.-Arg.
Kangkong Paya (climbing plant) = *Merremia hastata* Hall.
Kĕladi plant = *Colocasia esculentum* Schott.
Lalang (grass) = *Imperata cylindrica* Beauv.
Mahang Puteh (tree) = *Macaranga hypoleuca* Muell.-Arg.
Mango (tree) = *Mangifera indica* Linn.
Mĕmpĕlas (shrub) = *Tetracera indica* Merr.
Mĕmpoyan (tree) = *Rhodamnia trinervia* Blume.
Mĕndarong (shrub) = *Trema orientalis* Blume.
Paku Laut (sea fern) = *Cycas rumphii* Miq.
Papaya (tree) = *Carica papaya* Linn.
Pinang (palm) = *Areca catechu* Linn.
Pulai (tree) = *Alstonia angustiloba* Miq.
Queensland Swamp Oak (tree) = *Casuarina equisetifolia* Linn.
Rambutan (tree) = *Nephelium lappaceum* Linn.
Rubber Tree = *Hevea brasiliensis* Muell.-Arg.
Rumput Sambau (grass) = *Eleusine indica* Gaertn.
Rumput Sarang Buaya (grass) = *Ischaemum timorense* Kunth.
Rumput Tĕmbaga Jantan (grass) = *Ischaemum pubicum* Linn.
Sĕnjuang (shrub) = *Dracaena angustifolia* Roxb.
Sensitive Plant = *Mimosa pudica* Linn.
Shoe-flower (shrub) = *Hibiscus rosa-sinensis* Linn.
Straits Rhododendron (shrub) = *Melastoma malabathricum* Linn.
Tampinis (tree) = *Sloetia elongata* Koord.
Tĕmbusu (tree) = *Fagraea cochinchinensis* A. Chev.
Timun Dĕndang (climbing plant) = *Passiflora foetida* Linn.